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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/834,623	04/16/2001	Hiroyuki Suzuki	1095.1182	3910

21171 7590 11/04/2003

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EXAMINER	
THOMPSON, JAMES A	
ART UNIT	**PAPER NUMBER**
2624	

DATE MAILED: 11/04/2003 5

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/834,623	SUZUKI ET AL.	
	Examiner	Art Unit	
	James A Thompson	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-18 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-18 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

Part Mb of figure 1 and part S22 of figure 16 should read "line drawing/character area map" and not "line drawing/picture image area map." Furthermore, part S24 of figure 16 should read "line drawing/character image" and not "line drawing/picture image." This terminology is used throughout the disclosure in reference to said parts of said figures and is consistent with the applied meaning.

On page 8, line 14 of the specification, "the unit 14" should be replaced with "the halftone dot image binarizing unit 14" since "input unit" is referred to before "the unit." This could potentially cause confusion.

The paragraph contained on page 22, lines 11-17 of the specification should be moved to the section of the specification that describes figure 1. It would be more appropriate there and would allow for easier understanding of the disclosure. Said paragraph or portions thereof could then be referenced where needed.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-15 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohsawa (US Patent 4,876,610).

Regarding claim 1, Ohsawa discloses an input unit that inputs a binary image as a multi-valued image (column 3, lines 8-14 of Ohsawa). The data is read in via a charge-coupled device and converted into eight bit data, which corresponds to data of 256 levels. Ohsawa further discloses a halftone dot image area map creating unit that searches for a halftone dot image area that may be in the multi-valued image and creates a halftone dot image area map and a line drawing/character area map creating unit that searches for a line drawing/character image area that may be in the multi-valued image and creates a line drawing/character area map (column 4, lines 60-67 of Ohsawa). Ohsawa discriminates between areas consisting of photographs and background and areas consisting of characters and spots. Said method is performed in blocks of pixels (column 4, lines 14-15 of Ohsawa) and stores the results. This would be essentially the same as creating an area map. Ohsawa further discloses a halftone dot image binarizing unit that binarizes an input image corresponding to the halftone dot image area map while suppressing input read error that may occur when said input unit inputs the binary image, and generates a binarized halftone dot image (figure 1 (12,14,15) and column 3, lines 15-20 of Ohsawa). The input signal is corrected for a plurality of possible input problems. The resulting signal is then put in binary form via two binary digitizing circuits. Ohsawa further discloses a line drawing/character

smoothing unit that smoothes a jaggy contained in an input image corresponding to the line drawing/character area map, and generates a binarized line drawing/character image. Ohsawa uses smaller matrix blocks for edge and character data than for non-edge data when performing and error dispersion method (column 5, lines 11-14 and lines 19-20 of Ohsawa). The purpose of using smaller matrices is to reduce the area of the error dispersion, thereby reproducing characters and lines in precise manner (column 5, lines 14-18 of Ohsawa). The natural result of this would be to remove jaggy and other artifacts from lines and characters. Ohsawa further discloses an image combining unit that combines the binarized halftone dot image and the binarized line drawing/ character image (figure 1 (13-15) and column 3, lines 21-31 of Ohsawa). The discrimination circuit performs the function of combining the halftone dot image and line drawing/character image in that it selects which binary digitizing circuit outputs the binarized data to the printer. Thus, the data corresponding to the halftone dot image and line drawing/character image are combined in the output to the printer.

Regarding claim 18, the arguments regarding claim 1 are incorporated herein. The apparatus taught by Ohsawa performs the steps for the method of claim 18.

Regarding claim 2, Ohsawa discloses that said halftone dot image area map creating unit lists and stores at least one of center-of-gravity information about centers of gravity of halftone dots and boundary box information as information about halftone dots in the halftone dot image area. For each block of pixels, an average density of a central pixel and the surrounding pixels is calculated. Furthermore, an absolute difference between density of the central pixel and said average density are calculated

(figure 5b and column 4, lines 39-45 of Ohsawa). Said values are stored for later operations. This is essentially the same as storing center-of-gravity information. The image is processed in specified block sizes depending on whether the image data in said block is determined to be line drawing/character data or halftone image data (column 3, lines 21-31 of Ohsawa). Said blocks define the boundaries of the pixels that are processed and are stored for said processing.

Regarding claim 3, Ohsawa discloses that said halftone dot image area map creating unit calculates a halftone dot density in a given area by referring to the center-of-gravity information, and deletes corresponding information from the halftone dot image area map when the halftone dot density does not meet a given condition. The average halftone dot density is calculated in a given area defined by a central pixel and surrounding pixels (column 4, lines 39-42 of Ohsawa). If the absolute difference between said average halftone dot density and said central pixel is larger than a pre-defined threshold, then said area is determined to be an line drawing/character area and is thus deleted from the halftone dot image area map and incorporated into the mapping of the line drawing/character image area map (figures 5a and 5b and column 4, lines 42-45 and lines 60-66 of Ohsawa).

Regarding claim 4, the arguments regarding claim 3 are incorporated herein. Ohsawa teaches that said given area is delineated by boundary blocks (column 4, lines 14-16 and lines 55-59 of Ohsawa).

Regarding claim 5, Ohsawa discloses that said halftone dot image area map creating unit performs a first process of painting out a boundary box (column 5, lines 14-

18 of Ohsawa) and a second process of painting out a portion expanding from the boundary box on the basis of the boundary box information, the boundary box and the portion that have been painted out being included in the binarized halftone dot image (column 5, lines 19-25 of Ohsawa). Ohsawa teaches varying the size of the boundary box matrix based on the discrimination between edge and non-edge areas. Said variation effectively paints out a larger area than the initially defined boundary box and is based upon boundary box information, the boundary box, and the portion that has already been painted out. The boundary box is initially defined as the smaller matrix for an edge region. If the region is determined to be a non-edge region, then said boundary box is expanded.

Regarding claim 6, Ohsawa discloses that, when a gap pixel remains after the first and second processes are performed for each of all the center-of-gravity information, said halftone dot image area map creating unit paints out the gap pixel when a number of gap pixels is smaller than a predetermined threshold value. Ohsawa discloses that varying sizes of matrices are used to define the boundary boxes (column 5, lines 5-10 of Ohsawa). Ohsawa processes the image data in succession (column 3, lines 54-62 of Ohsawa), so there is an inherent overlap between boundary boxes in the image area map. Therefore, any potential gaps between a set of boundary boxes are effectively painted over by said overlap.

Regarding claim 7, Ohsawa discloses that said line drawing/character area map creating unit detects a closed area from the multi-valued image in order to create the line drawing/character area map, said closed area corresponding to the line drawing/

character area. Said closed area is taken from the multi-valued image data in discrete rectangular blocks. Said multi-valued image data is stored in the line buffers (column 4, lines 14-19 and lines 55-59 of Ohsawa). Said multi-valued data is determined to be either edge/character data or non-edge data (column 4, lines 47-54 of Ohsawa). The data blocks determined to be edge/character data form what is essentially the line drawing/character area map, as discussed in the arguments regarding claim 1.

Regarding claim 8, Ohsawa discloses that said halftone dot image binarizing unit sets a proximity area close to a target pixel that is included in the input image corresponding to the halftone dot image area map and is to be binarized. Ohsawa teaches a center pixel (column 4, lines 37-39 of Ohsawa), which is essentially the same as said target pixel, which has a proximity area set around and close to it (column 4, line 37 and column 5, lines 19-20 of Ohsawa). Said area is included in the input image corresponding to the halftone dot image area map (column 4, lines 64-66 of Ohsawa). Said area and said halftone dot image are to be binarized (figure 1 (13-17) of Ohsawa).

Regarding claim 9, Ohsawa teach that said halftone dot image binarizing unit adaptively determines a threshold value for binarization on the basis of a distribution of pixel values in the halftone dot image area. Ohsawa teaches a binary digitizing process that disperses the image data error throughout the block under consideration, utilizing weighting and normalization coefficients (column 7, lines 21-45 of Ohsawa). This dispersion helps to correct the signal values. The corrected signal values are then compared with a threshold value (column 7, lines 46-50 of Ohsawa). The corrected signal is dependent upon the distribution of pixel values throughout the block and the

size of the block itself (figures 7a and 7b of Ohsawa). Adaptively altering the pixel values based on the pixel value distribution in the halftone dot image area and then comparing that with a threshold value would have the same effect as adaptively altering the threshold value in a similar manner, but leaving the pixel values static. The results are then binarized and output to a printer (figure 6 (63-65) of Ohsawa).

Regarding claim 10, Ohsawa discloses that said halftone dot image binarizing unit changes a value of the target pixel on the basis of the distribution, a changed value of the target pixel being used for binarization. Ohsawa teaches a binary digitizing process that disperses the image data error throughout the block under consideration, utilizing weighting and normalization coefficients (column 7, lines 21-45 of Ohsawa). This dispersion helps to correct the signal values. The corrected signal values are then compared with a threshold value (column 7, lines 46-50 of Ohsawa). The corrected signal is dependent upon the distribution of pixel values throughout the block and the size of the block itself (figures 7a and 7b of Ohsawa). The results are then binarized and output to a printer (figure 6 (63-65) of Ohsawa).

Regarding claim 11, Ohsawa discloses that when said halftone dot image binarizing unit detects an inclination in regard of pixel values on the basis of distribution thereof (column 4, lines 55-66 of Ohsawa), the halftone dot image binarizing unit does not binarize the target pixel in the absence of change of the value thereof. Ohsawa performs binary digitization by altering the pixel value based on an error dispersion calculation (column 5, lines 5-10 and column 7, line 30 of Ohsawa). If there is no

change in the value, additional binarization is not required. Any binarization performed by Ohsawa under these conditions is redundant.

Regarding claim 12, Ohsawa discloses that said halftone image binarizing unit determines whether the value of the target pixel should be increased or decreased on the basis of the distribution. Ohsawa uses weighting functions that vary with location and depend upon the matrix distribution (figures 6, 7a and 7b and column 7, lines 21-32 of Ohsawa).

Regarding claim 13, Ohsawa discloses that said halftone dot image binarizing unit calculates the changed value of the target pixel from a maximum pixel value available in the halftone dot image area when it is determined that the value of the target pixel should be increased, and calculates the changed value of the target pixel from a minimum pixel value available in the halftone dot image area when it is determined that the value of the target pixel should be decreased. The center pixel value of an image block is either increased or decreased based on the error dispersion calculation, along with the other pixels in said image block (column 7, lines 21-35 of Ohsawa). Ohsawa determines the minimum and maximum values of said image block and compares the difference between the maximum and minimum values in said image block with a threshold value (column 4, lines 55-59 of Ohsawa). The center pixel value is then binarized to either 0 or 255 – for eight bit image data – based on said comparison with said threshold value (column 7, lines 46-50 of Ohsawa).

Regarding claim 14, Ohsawa discloses that said halftone dot image binarizing unit obtains a difference between the value of the target pixel and the changed value

thereof, and restrains the changed value when the changed value is larger than a given threshold value. Ohsawa calculates the normalized signal error, which is the difference between the original signal value and the corrected signal value (column 7, line 30 of Ohsawa). The value of the corrected signal is restrained since it cannot be greater than the maximum possible pixel value (column 7, lines 49-50 of Ohsawa). The maximum pixel value acts as a threshold for the signal values.

Regarding claim 15, Ohsawa discloses that said halftone dot binarizing unit binarizes original values of target pixels that are not changed and changed values of other target pixels by using a threshold value for binarization. Whether the values of the target pixels have been altered or not, Ohsawa binarizes said target pixels based on a threshold value (column 7, lines 46-50 of Ohsawa). If the error values are zero, then the equation given in column 7, line 30 of Ohsawa will have no effect on said original value. If said error values are non-zero, then said equation will have an effect. Either way, said target pixel value is binarized based on said threshold value.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohsawa (US Patent 4,876,610) in view of Graham (US Patent 5,222,154).

Regarding claim 16, Ohsawa discloses a line drawing/character smoothing unit that detects the jaggy contained in the input image (column 4, lines 55-63 and column 5, lines 14-18 of Ohsawa). Ohsawa does not disclose expressly counting a number of black pixels in each row or column in a given area of the input image corresponding to the line drawing/character area map, and detects the jaggy contained in the input image on the basis of ratios of black pixels between rows and columns. Graham does disclose a method that performs the same essential function as counting a number of black pixels in each row or column in a given area of the input image corresponding to the line drawing/character area map, and detecting the jaggy contained in the input image on the basis of ratios of black pixels between rows and columns. Graham teaches looking for changes along the vertical and horizontal directions in order to detect a jaggy (column 11, line 65 to column 12, line 2 of Graham). If a black pixel or a comparatively small number of black pixels are surrounded by white pixels, then the black pixel is considered a jaggy (figures 13 and 16 of Graham). Said black pixel(s) are then removed (figure 13 (1302) of Graham). Also, if a white pixel or a comparatively small number of white pixels are surrounded by black pixels, then said white pixel(s) are painted out. Ohsawa and Graham are combinable because they are from the same field of endeavor, namely image processing and artifact suppression. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use ratios of black pixels between rows and columns for the purpose of detecting jaggy. The

suggestion for doing so would have been to use an alternate jaggy detection and elimination method. Therefore, it would have been obvious to combine Graham with Ohsawa to obtain the invention as specified in claim 16.

Regarding claim 17, Ohsawa discloses a line drawing/character smoothing unit that detects the jaggy contained in the input image (column 4, lines 55-63 and column 5, lines 14-18 of Ohsawa). Ohsawa does not disclose expressly setting a mask in the given area to count the number of black pixels in each row or column in said mask, and shifts the mask to count the number of black pixels only in a new row or column that is not included in the mask before shifting, so that the jaggy can be detected by the number of black pixels before and after the mask is shifted. Graham teaches a shifting area of consideration, which is essentially the same as a mask, for the sake of determining a jaggy (column 12, lines 7-18 of Graham). Said area examines regions for jaggy based on relations between pixel values before and after said area is shifted by a column or a row. Said area is shifted to further analyze the image data for jaggy. Ohsawa and Graham are combinable because they are from the same field of endeavor, namely image processing and artifact suppression. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a shifting area of consideration for the jaggy detection and processing. The suggestion for doing so would have been the fact that the area needed to detect jaggy changes as the pixels under consideration change. Therefore, it would have been obvious to combine Graham with Ohsawa to obtain the invention as specified in claim 17.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Katayama, et al., US Patent 4,958,218, September 18, 1990.

Fujisawa, Tetsuo, US Patent 5,014,124, May 7, 1991.

Yamada, Hirokazu, US Patent 5,815,287, September 29, 1998.

Kamon, Kouichi, US Patent 5,920,646, July 6, 1999.

Takenouchi, et al., US Patent 6,178,010 B1, January 23, 2001.

Yamada, et al., US Patent 6,333,788 B1, December 25, 2001.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A Thompson whose telephone number is 703-305-6329. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 703-308-7452. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3500.

James A. Thompson
Examiner
Art Unit 2624

JAT
October 2, 2003

David Moore

DAVID MOORE
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